Canada-Manitoba

FLOOD DAMAGE REDUCTION PROGRAM

Annual Report

1987-1988

October 1988

Canada

Manitoba

CANADA-MANITOBA FLOOD DAMAGE REDUCTION PROGRAM

ANNUAL REPORT

FOR

THE PERIOD

APRIL 1, 1987 TO MARCH 31, 1988

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October 1988

Canada Manitoba

Canada-Manitoba Flood Damage Reduction Program
— Steering Committee —

The Honourable Tom McMillan
Minister
Department of the Environment
Ottawa, Ontario
K1A 0H0

The Honourable Jack Penner
Minister
Manitoba Natural Resources
Winnipeg, Manitoba
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Gentleman:

I am pleased to present the eleventh Annual Report of the Canada-Manitoba Steering Committee on the Flood Damage Reduction Program. This report covers the progress made during the period April 1, 1987 to March 31, 1988. The work in the program is authorized by the Agreement Respecting Flood Risk Mapping and the Agreement Respecting Studies for Flood Damage Reduction signed by Canada and Manitoba on December 20, 1976, by the Amending Agreement signed on March 31, 1981, by the Amending Letters of Exchange signed on September 6, 1985, and by the Agreement Respecting Flood Forecasting signed on March 31, 1981.

Under the Agreement Respecting Flood Risk Mapping, the flood prone lands at Arborg, Fisher Branch and Riverton were designated on November 5, 1987. In Winnipeg, the floodway and floodway fringe areas in two areas adjacent to the Red River were amended. The first area was east of Kilkenny Drive between the South Perimeter Highway and Radcliffe Road. The second area was west of River Road near the the St. Amant Centre. The study to identify the flood risk areas along Omands Creek in the City of Winnipeg was completed. Approval was received to designate the flood risk areas of Neepawa on March 17, 1988. However, because the Agreement Respecting Flood Risk Mapping terminated on March 31, 1988, the Steering Committee decided not to proceed with the designation until a new agreement is in effect.

Work on improving conventional flood forecasting methodology continued under the Agreement Respecting Flood Forecasting. Preparation of a final draft report on Phase Two activities for the period February, 1984 to March, 1986 was completed.

During the reporting period, expenditures totaling $234,607.35 were shared equally between Canada and Manitoba for flood risk mapping, flood damage reduction studies and flood forecasting programs.

Yours truly,

John N. Whiting
Chairman, Steering Committee
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SUMMARY

The base maps prepared by Manitoba Surveys and Mapping Branch for The Pas, Virden, and the Westwood, Charleswood and St. Norbert areas of Winnipeg were inspected and approved by Energy, Mines and Resources, Canada. This completes the base mapping projects planned under the Flood Risk Mapping Program.

The flood risk areas of Arborg, Fisher Branch and Riverton were designated on November 5, 1987. This brings the number of communities designated under the Program to sixteen. Approval was obtained on March 17, 1988 to designate the Town of Neepawa. Because the Agreement Respecting Flood Risk Mapping terminated on March 31, 1988, it was decided to postpone designation until a new agreement is in place.

In the City of Winnipeg, a flood risk study was completed for Omands Creek and the floodway and floodway fringe areas in two areas adjacent to the Red River were amended. The first area was east of Kilkenny Drive between the South Perimeter Highway and Radcliffe Road. The second area was west of River Road near the the St. Amant Centre.

Studies for flood damage reduction measures for the communities of Morden and Riverton continued under the Agreement Respecting Studies for Flood Damage Reduction. Not much work will be done during the coming year under the Agreement Respecting Studies for Flood Damage Reduction as almost all the funds have been expended.

Work on improving conventional flood forecasting methodology continued under the Agreement Respecting Flood Forecasting. Preparation of a final draft report on Phase Two activities for the period February, 1984 to March, 1986 was completed.

During the period of this report, expenditures totaling $234,607.35 were shared equally between Canada and Manitoba for flood risk mapping, flood damage reduction studies and flood forecasting programs. To date $2,346,113.57 has been spent on flood risk mapping activities, $302,216.64 on flood damage reduction studies and $819,644.51 on flood forecasting activities.

Chapter 1

THE CANADA-MANITOBA FLOOD DAMAGE REDUCTION AGREEMENTS

On December 20, 1976, the Governments of Canada and Manitoba signed three agreements whose collective aim is to reduce the potential for flood damages in Manitoba over the long term. These agreements recognize that the best way to reduce potential flood damage is to keep flood prone development out of the floodplain. Protection of existing development could involve a combination of structural and non-structural alternatives, including allowing some flooding to occur once the potential for flooding has been identified.

1.1 Introduction

The eleventh annual report reviews work activities and progress of the Canada-Manitoba Flood Damage Reduction Program during the period from April 1, 1987 to March 31, 1988.

1.2 General Agreement Respecting Flood Damage Reduction

The General Agreement outlines the policies respecting government undertakings and programs in flood risk areas and provides a co-ordinated framework for a number of implementation sub-agreements. Listed below are the agreements which are now in effect.

1.3 Agreement Respecting Flood Risk Mapping

This Agreement provides for a flood risk mapping program to determine and subsequently designate those urban areas within Manitoba that are prone to flooding. Appendix A lists "Areas and Floodways to be Mapped in the Province of Manitoba" as described in the original Agreement Respecting Flood Risk Mapping, including the additions and deletions incorporated in the Amending Agreement (noted below). Provincial and federal Orders-in-Council were passed to add the main rivers in Winnipeg to Schedule A. A public information program is conducted to inform people of the merits of the program, and to encourage acceptance and active participation.

1.4 Agreement Respecting Studies for Flood Damage Reduction

This Agreement provides for studies in specific problem areas to determine the most suitable measures for reducing or mitigating the damaging effects of floods on existing developments.

1.5 Amending Agreement, 1981

In order to complete all the work scheduled in the Agreement Respecting Flood Risk Mapping and because of the need for additional funds, an amending agreement was negotiated between Canada and Manitoba during 1980-81. The General Agreement Respecting Flood Damage Reduction was extended to December 31, 1990. The Agreement Respecting Flood Risk Mapping was extended to December 31, 1984 with additional funds of $1,490,000. The termination date of the Agreement Respecting Studies for Flood Damage Reduction was changed to December 31, 1985 with no additional funding. Beausejour was removed from the list of places to be mapped because no serious flood problem exists there. It was replaced by the Town of Gimli.

1.6 Amendments, 1985

Further amendments to the three flood damage reduction agreements were negotiated between Canada and Manitoba and concluded by an exchange of letters on September 6, 1985. The amendments were necessary in order to carry out the work scheduled in the Agreement Respecting Flood Risk Mapping and the Agreement Respecting Studies for Flood Damage Reduction. Specifically, the amendments were an extension to the General Agreement Respecting Flood Damage Reduction from December 31, 1990 to March 31, 1994; an extension of the Agreement Respecting Flood Risk Mapping from December 31, 1984 to March 31, 1988 with additional funds of $160,000; and an extension to the Agreement Respecting Studies for Flood Damage Reduction from December

31, 1985 to March 31, 1989.

1.7 Agreement Respecting Flood Forecasting

This Agreement, a sub-agreement to the General Agreement Respecting Flood Damage Reduction, was signed by Canada and Manitoba on March 31, 1981. The objective of the Agreement is to improve the flood forecasting capability for the Red, Assiniboine and Souris rivers in Manitoba.

The Agreement is divided into two phases. The first phase consisted of a pilot project on the Boyne River to develop a suitable improved streamflow forecasting model and the testing and evaluation of alternate streamflow routing and field data acquisition systems. The second phase provides for the improvement of flood forecasting procedures for the Red, Assiniboine and Souris rivers.

Research to date has indicated that the conventional forecasting system now in place has the potential, with some improvements, to provide forecasts of comparable accuracy with much less effort than the sophisticated model (HSPF) investigated under this Agreement. In order to complete these improvements and to meet the objectives of the Agreement, amendments were approved on April 30, 1987 to extend the termination date from March 31, 1986 to September 30, 1989 with additional funding of $400,000.

1.8 Agreement Respecting the Construction of Flood Protection Projects in Manitoba

The Agreement Respecting the Upgrading of Ring Dykes in the Red River Valley was signed on March 10, 1983 to upgrade the ring-dykes at eight communities in the Valley. The original Agreement provides up to $4.5 million to raise existing ring-dykes at Emerson, Letellier, Dominion City, St. Jean Baptiste, Morris, Rosenort, Brunkild and St. Adolphe to withstand a 100-year flood. The federal government has agreed to fund 45 per cent of the capital cost of the project while the Province is responsible for 55 per cent. Ring-dykes are the only practical measures to protect existing and future development in these communities. Flood waters spread out for many kilometres in the very flat valley and the alternative of diverting development to areas that are not flood prone is not feasible.

Amendments to the Agreement Respecting the Upgrading of Ring Dykes in the Red River Valley were signed on May 22, 1985. The amendments consisted of an extension in time to March 31, 1989 and the provision of an additional $1.6 million in funding for upgrading the dyking system at the Village of Ste. Rose du Lac and the construction of a dyke protecting the water treatment plant at the Town of Souris. With the addition of Ste. Rose du Lac and Souris which are outside of the Red River Valley, the Agreement was renamed "An Agreement Respecting the Construction of Flood Protection Projects in Manitoba".

Dyke upgrading for the communities of Letellier, St. Jean Baptiste, Morris, Rosenort and Brunkild have been completed. Work continues at Emerson, Dominion City, St. Adolphe, Souris and Ste. Rose du Lac.

Negotiation of the Agreement was co-ordinated by the Steering Committee responsible for the Flood Damage Reduction Program. However, this Agreement is managed and reported on to the ministers by the Implementation Committee.

During the next fiscal year negotiations will be undertaken to extend the Agreement Respecting Flood Risk Mapping, the Agreement Respecting Studies for Flood Damage Reduction, and the Agreement Respecting the Construction of Flood Protection Projects in Manitoba.

Chapter 2

PROGRAM ORGANIZATION

2.1 Introduction

Under the terms of the General Agreement Respecting Flood Damage Reduction, a Steering Committee was established consisting of two members appointed by the Minister of the Environment for Canada and two members appointed by the Minister of Natural Resources for Manitoba. The Steering Committee provides direction for the program and reports to the ministers annually.

A Technical Committee on Flood Risk Mapping was established under the terms of the Agreement Respecting Flood Risk Mapping. This committee consists of two members appointed by the Minister of the Environment for Canada and two members appointed by the Minister of Natural Resources for Manitoba. The Technical Committee supervises and conducts the work program of the Agreement Respecting Flood Risk Mapping, and reports to the Steering Committee.

A Studies Sub-Committee was established in mid-1981 by the Steering Committee to oversee the work conducted under the Agreement Respecting Studies for Flood Damage Reduction. This Sub-Committee consists of three members. The federal Co-Chairman of the Steering Committee appointed one member, while the provincial Co-Chairman of the Steering Committee appointed two members.

A Technical Sub-Committee on Flood Forecasting was established by the Steering Committee to supervise and undertake tasks under the terms of the Agreement Respecting Flood Forecasting. The Committee consists of two members appointed by the federal Co-Chairman of the Steering Committee and two members appointed by the provincial Co-Chairman.

2.2 Membership: Steering Committee

Members of the Steering Committee in 1987-88 were:

Canada	Manitoba
Mr. R. A. Halliday (Co-Chairman) Director Inland Waters Directorate Western and Northern Region Environment Canada Regina, Saskatchewan	Mr. J. N. Whiting (Co-Chairman) Director Municipal Planning Branch Manitoba Municipal Affairs Winnipeg, Manitoba
Dr. R. D. Bjonback Chief Water Planning and Management Branch Inland Waters Directorate Regina, Saskatchewan	Mr. L. J. Whitney Chief, Water Management Water Resources Branch Manitoba Natural Resources Winnipeg, Manitoba

Mr. Whitney replaced Mr. N. Mudry as the member from Manitoba Natural Resources at the 44th Meeting of the Steering Committee held on November 13, 1987. Dr. Bjonback replaced Mr. R. L. Pentland as the member from Water Planning and Management Branch at the 45th Meeting of the Steering Committee held on January 22, 1988. In accordance with guidelines established in the General Agreement Respecting Flood Damage Reduction, the chairmanship alternated to the provincial side of the Steering Committee. Mr. Whiting served as chairman at the five meetings held in Winnipeg during the report year. Mr. R. Richardson of Manitoba Natural Resources acted as secretary.

2.3 Membership: Technical Committee on Flood Risk Mapping

Members of the Technical Committee in 1987-88 were:

Canada	Manitoba
Mr. H. Naik (Co-Chairman) Senior Water Resources Planner Water Planning and Management Branch Western and Northern Region Environment Canada Regina, Saskatchewan	Mr. F. P. Barlishen (Co-Chairman) Head Flood Damage Reduction Section Water Resources Branch Manitoba Natural Resources Winnipeg, Manitoba
Mr. D. G. Anderson Chief Data Acquisition and Program Planning Topographical Survey Directorate Energy, Mines and Resources Canada Ottawa, Ontario	Mr. F. W. Leeman Chief Mapping Section Surveys and Mapping Branch Manitoba Natural Resources Winnipeg, Manitoba

Based on the same guidelines as those for the Steering Committee, the federal side resumed the chairmanship for fiscal year 1987-88. Mr. Naik chaired the three meetings held in Winnipeg during the reporting period. Mr. G. Weiss of Environment Canada, Regina served as secretary.

2.4 Membership: Studies Sub-Committee

Members of the Studies Sub-Committee in 1987-88 were:

Canada	Manitoba
Mr. H. Naik (Co-Chairman) Senior Water Resources Planner Water Planning and Management Branch Western and Northern Region Environment Canada Regina, Saskatchewan	Mr. F. P. Barlishen (Co-Chairman) Head Flood Damage Reduction Section Water Resources Branch Manitoba Natural Resources Winnipeg, Manitoba
	Dr. H. Schellenberg Agricultural Resource Economist Manitoba Agriculture Winnipeg, Manitoba

Based on the same guidelines as those for the Steering Committee, the provincial side resumed the chairmanship for the fiscal year 1987-88. There were no meetings held during the reporting period as no studies were completed during 1987-88.

2.5 Membership: Technical Sub-Committee on Flood Forecasting

Members of the Flood Forecasting Sub-Committee in 1987-88 were:

Canada	Manitoba
Mr. R. A. Hale (Co-Chairman) Regional Chief Water Resources Branch Environment Canada Winnipeg, Manitoba	Mr. V. M. Austford (Co-Chairman) Chief of Hydrotechnical Services Water Resources Branch Manitoba Natural Resources Winnipeg, Manitoba
Mr. R. L. Raddatz Scientific Services Meteorologist Scientific Services Division Atmospheric Environment Service Environment Canada Winnipeg, Manitoba	Mr. R. J. Bowering Head Hydrology Section Water Resources Branch Manitoba Natural Resources Winnipeg, Manitoba

Mr. Austford was chairman for the fiscal year 1987-88. Three meetings were held in Winnipeg. Mr. A. A. Warkentin of the Manitoba Water Resources Branch acted as secretary.

Chapter 3

PROGRAM IMPLEMENTATION

3.1 Scope

Originally, flood risk maps and flood damage reduction studies were to be prepared for 45 communities in Manitoba as listed in Schedule A of the Agreement Respecting Flood Risk Mapping (this schedule with amendments and additions is shown as Appendix A). A location map is attached as Appendix B. However, Canada and Manitoba signed an agreement on March 10, 1983 to share the cost of upgrading existing dyking systems to the one per cent flood protection level in eight of these communities. Therefore, mapping or studies are not necessary for the communities of Emerson, Letellier, Dominion City, St. Jean Baptiste, Morris, Rosenort, Brunkild or St. Adolphe. Although the base maps have been completed for Ste. Rose du Lac, no flood risk mapping studies will be undertaken as plans are continuing for the upgrading of the flood protection works in the community under the Flood Protection Projects Program.

Flood risk areas are determined and plotted on detailed engineering maps and smaller scale public information maps. Policies which discourage further flood prone development come into effect when the Minister of the Environment for Canada and the Minister of Natural Resources for Manitoba designate the flood risk areas.

In communities where flood damage reduction studies are deemed necessary, an analysis is undertaken to determine the most economical and suitable measures to protect existing development from future flood damages. Agreements are negotiated to fund the construction of flood protection works, if such works are shown to be feasible and economically viable.

Research into developing improved flood forecasting procedures for the Red, Assiniboine and Souris rivers in Manitoba was conducted under the Agreement Respecting Flood Forecasting. This involved calibration of the HSPF hydrologic model on key tributaries of these rivers. Research into developing new forecasting procedures was concluded in 1985-86. Since that time, work has been directed towards improving the conventional forecasting system, mainly through the development of improved stream

channel routing procedures and improved field data acquisition systems.

A Canada-Manitoba flood forecasting centre was established in Winnipeg as part of Phase I under the Agreement Respecting Flood Forecasting.

3.2 Schedule

During the first year of the Flood Damage Reduction Program, a community work program schedule was prepared for the 45 centres to be mapped, based on flood history, and recognizing the potential for future developments in undeveloped urban flood prone areas. Since then, the City of Winnipeg and the Additional Zone were added to Schedule A; the General Agreement Respecting Flood Damage Reduction was extended to 1994; the Agreement Respecting Flood Risk Mapping to 1988; the Agreement Respecting Studies for Flood Damage Reduction to 1989; Phase One of the Agreement Respecting Flood Forecasting to 1984, and Phase Two was extended to 1986. A further extension to the Agreement Respecting Flood Forecasting to September, 1989 was requested and approved in 1987.

3.3 Methodology

3.3.1 Flood Risk Mapping

The work program at each community for the flood risk mapping and flood damage reduction (FDR) studies begins with the preparation of 1:2000 scale base maps showing planimetric and topographic information. Base map production is carried out in four steps, namely, aerial photography, control survey, aerial triangulation and map compilation.

Following the map preparation, hydrologic studies are undertaken to determine the magnitude of the design flood and the watershed's response to flood-generating events. The results of these studies function as an input to the hydraulic studies which systematically define design flood water surface profiles throughout the communities. The resulting flood risk lines are delineated on the base maps which are then used for engineering and planning purposes.

The Steering and Technical committees consult with the local government officials, to ensure a local awareness of the intent and implications of the program. They also review the delineation of the flood lines with the local officials to seek their support in the implementation of the policies of the program.

When the Steering Committee has concurred in the delineation of the flood risk area and floodway (where applicable), the preliminary flood lines, which are plotted on the 1:2000 scale maps, are presented to the local councils for their review. The Ministers are then asked for their approval of the designation. Public information maps and brochures are prepared.

The public information program is conducted concurrently with the mapping process. Citizens of the community are made aware of the Flood Damage Reduction Program through meetings, brochures, maps and the media.

3.3.2 Flood Damage Reduction Studies

Flood damage reduction studies are undertaken for selected communities. The purpose is to determine the measure which has the most favourable benefit-cost ratio for minimizing flood damage potential of existing development and also to guide future floodplain development practices. The studies describe present land uses, assess potential flood damages and identify and evaluate alternatives for reducing the potential for flood damage. Among the range of measures considered are structural and non-structural alternatives such as dyking, floodproofing, flood forecasting systems, emergency action and zoning. Zoning and formulation of by-laws for flood prone lands at the local government level are encouraged by program officials.

In a community where a dyke exists, the flood damage reduction study would include a geotechnical study of the dyke to assess the dyke's stability and to determine the requirement, if any, for upgrading the dyke to a standard acceptable under the Flood Damage Reduction Program. A survey by questionnaire or some other means would be undertaken in some communities where a recent large flood occurred. This survey would determine the exact extent of damage caused by that flood. The results can be used to estimate the damages that would be caused by other floods up to the design flood. A field survey is conducted in most communities to determine the first floor elevations of all structures in the flood risk area. The study report is used as the basis for a recommendation to governments on construction of flood mitigation works or implementation of non-structural measures such as purchase of flood prone properties.

3.3.3 Flood Forecasting

The Flood Forecasting Program is divided into two phases. Phase One, which was completed on February 3, 1984, was a pilot project consisted mainly of a review of streamflow simulation models and testing and evaluation of the most promising models on the Boyne River. Results of the detailed testing were analyzed and forecast accuracies were compared to those of current methods. Other work in Phase One included establishment and testing of real time hydrometeorological data acquisition systems and an evaluation of stream channel routing procedures. Phase Two originally provided for the further refining of the model and its application to the Red, Assiniboine and Souris River watersheds. However, the study has indicated that the conventional forecasting methodology has the potential, with improvements, to provide forecasts of similar accuracy with significantly less effort.

3.4 Work Assignments

All work activities under the Flood Damage Reduction Program are conducted under the general direction of the Steering Committee. The Flood Risk Mapping Technical Committee, the Studies Sub-Committee and the Flood Forecasting Sub-Committee supervise the work in their respective programs, and report to the Steering Committee on progress of work and on major issues.

With the exception of Virden, The Pas and the supplementary sheets in Winnipeg, which were done by Manitoba Surveys and Mapping Branch (MSMB), the 1:2000 base maps and smaller scale public information maps have been compiled by private contractors. The inspection responsibility has been vested in the Director of Topographical Survey Division, Surveys and Mapping Branch of the Department of Energy, Mines and Resources Canada with the exception of the inspection of the aerial photography and survey control which, de facto, has been the responsibility of the Surveys and Mapping Branch of Manitoba Natural Resources. The use of the Manitoba Surveys and Mapping Branch mapping specifications was approved by the Technical Committee in 1981. The MSMB also has responsibility for the administration of tender invitation and awarding all contract work in accordance with the provincial contracting policies and the Canada-Manitoba Flood Damage Reduction Program.

The Water Resources Branch of Manitoba Natural Resources (MWRB) conducts all of the hydrologic and the majority of the hydraulic studies. Some hydraulic studies had been done by consultants and by Environment Canada. The MWRB is responsible for the administration of hydraulic study contracts. Cross section surveys of the river channels are undertaken by the Engineering and Construction Branch of Manitoba Natural Resources.

The MWRB and Environment Canada, Regina, jointly conduct the public information program. The Communications, Economics and Planning Branch of Manitoba Natural Resources had played an important role in this program by preparing brochures for each community, liaising with local officials, arranging meetings with local councils and the public, preparing publicity for meetings, and providing information to all government agencies and municipalities on the implications of the Flood Damage Reduction Program. During 1987-88 its role was limited to co-ordinating the preparation and printing of the brochures and publicizing meetings. The MWRB carried out the other duties.

The MWRB plays the lead role in the forecasting studies under the Flood Forecasting Program. The Inland Waters Directorate and the Atmospheric Environment Service of Environment Canada, Winnipeg play the lead role in testing the real-time hydrometeorological data acquisition system. The Water Planning and Management Branch of Environment Canada in Ottawa is evaluating the applicability of dynamic channel routing on the Red River in Manitoba.

Manitoba Natural Resources provides the initial funding for the program and submits statements to Environment Canada for cost-sharing. Under the supervision of the Technical Committee, the MWRB is responsible for the overall administration of all

contracts under the Flood Damage Reduction Program.

3.5 Expenditures

The Agreement Respecting Flood Risk Mapping originally provided for a total expenditure of $700,000 over five years. The Amending Agreement provided an additional $1,490,000 to complete most of the required mapping. An additional $160,000 was provided in 1985-86 under a further extension. A total of $310,000 was available for flood damage reduction studies under the Agreement Respecting Studies for Flood Damage Reduction. A total of $600,000 was allocated to implement the Agreement Respecting Flood Forecasting. An additional $400,000 was approved by both parties in 1987.

Expenditures from December 20, 1976 to March 31, 1988 are summarized in Table I. These costs were shared equally by Canada and Manitoba.

Chapter 4

ACTIVITIES UNDER THE FLOOD DAMAGE REDUCTION AGREEMENTS, 1987-88

4.1 Flood Risk Mapping Program

4.1.1 Designation

The highlights of the year were the designation of the flood risk areas of the Icelandic River in Arborg and in Riverton and the designation of the flood risk areas of the Fisher River in Fisher Branch. The designation took effect on November 5, 1987. Thirteen communities have been designated previously under the program:

Melita	-	Interim	-	December 20, 1979
Wawanesa	-	Interim	-	December 20, 1979
Winnipeg	-	Interim	-	February 15, 1980
Souris	-	Final	-	October 1, 1980
Elie	-	Final	-	November 5, 1980
Brandon	-	Final	-	March 26, 1982
Starbuck	-	Final	-	November 26, 1982
Sanford	-	Final	-	November 26, 1982
La Salle	-	Final	-	November 26, 1982
Swan River	-	Final	-	May 11, 1983
Dauphin	-	Final	-	February 15, 1984
Carman	-	Final	-	June 13, 1984
Lorette	-	Final	-	September 13, 1984

The flood risk areas of a community are designated on an interim basis if the base maps showing the flood risk areas do not entirely meet the technical requirements of Schedules B and C of the Agreement Respecting Flood Risk Mapping.

4.1.2 Arborg: Icelandic River

The flood risk areas at Arborg were designated on November 5, 1987. A public information map and brochure were distributed to the residents at the public meeting held on November 16, 1987.

4.1.3 Fisher Branch: Fisher River

The flood risk areas at Fisher Branch were designated on November 5, 1987. A public information map and brochure were distributed to the residents at the public meeting held on January 21, 1988.

No work was done during the period of this report for the following communities:

4.1.4 Gimli: Gimli Airport Drain

4.1.5 Gladstone: Whitemud River

4.1.6 Grande Pointe: Seine River

4.1.7 Gretna: Pembina River

4.1.8 La Riviere: Pembina River

4.1.9 MacGregor: Beaver Creek

4.1.10 Melita: Souris River

Interim designation has been in effect since December 20, 1979. No work was done towards final designation during the period of this report.

4.1.11 Minnedosa: Little Saskatchewan River

No work was done during the period of this report.

4.1.12 Morden: Dead Horse Creek

The preparation of the flood risk maps was completed to the stage where the designation date and the ministers signature are required.

A delegation from the the Town of Morden met with the Steering Committee to discuss designation, floodproofing requirements, hydrology, a zoning bylaw and other floodplain management topics on April 29, 1987. The Chairman responded to their written submission by letter dated October 26, 1987. The response included suggested revisions to the proposed zoning bylaw on floodproofing requirements. No final bylaw has been passed as yet.

The study of flood damage reduction measures, which began in 1986-87, was not completed.

4.1.13 Neepawa: Whitemud River

Concurrence to designate the flood risk areas at Neepawa was given by the Minister of the Environment for Canada on March 17, 1988. As the Agreement Respecting Flood Risk Mapping terminated on March 31, 1988, the Steering Committee decided not to proceed with designation until there is a new agreement to continue the program. Preparation of the flood risk maps is near completion.

4.1.14 Ochre River: Ochre River

No work was done during the period of this report.

4.1.15 Riverton: Icelandic River

The flood risk areas at Riverton were designated on November 5, 1987. A public information map and brochure were distributed to the residents at the public meeting held on November 9, 1987.

The study of flood damage reduction measures, which began in 1986-87, was not completed.

4.1.16 Ste. Anne: Seine River

No work was done during the period of this report.

4.1.17 Ste. Rose du Lac: Turtle River

No work was done during the period of this report. Plans to protect the community from future floods by construction of protection works under the Agreement Respecting the Construction of Flood Protection Projects in Manitoba were delayed due to the call by the Minister of Manitoba Natural Resources for a Public Inquiry under the Manitoba Expropriation Act because of a number of objecting landowners. The Inquiry was held during the week of September 14-18, 1987 with the Inquiry Officer finding that the taking of the land was just and fair. However, some landowners applied to the Court of Queen's Bench to have the project quashed. The court hearing was held on March

4, 1988 with no decision handed down by the court as of March 31, 1988. The design of the flood protection works was completed.

4.1.18 Souris: Souris River

No work was done during the period of this report. The design of the flood protection works to protect the water treatment plant under the Agreement Respecting the Construction of Flood Protection Projects in Manitoba was completed. The necessary right-of-way was obtained.

4.1.19 The Pas: Saskatchewan River

Energy, Mines and Resources, Canada inspected and approved the base maps prepared by Manitoba Surveys and Mapping Branch.

4.1.20 Virden: Bosshill, Gopher, and Scallion Creeks

Energy, Mines and Resources, Canada inspected and approved the base maps prepared by Manitoba Surveys and Mapping Branch.

4.1.21 Wawanesa: Souris River

Interim designation took place on December 20, 1979. No work was done towards final designation during the period of this report.

4.1.22 Westbourne: Whitemud River

No work was done during the period of this report.

4.1.23 Winnipeg

4.1.23.1 Red and Assiniboine Rivers and Tributaries

Energy, Mines and Resources, Canada inspected and approved the base maps of the Westwood, Charleswood and St. Norbert areas of Winnipeg prepared by Manitoba Surveys and Mapping Branch.

The floodway and floodway fringe of two areas adjacent to the Red River were amended during 1987-88. The first area is between Kilkenny Drive and the Red River from the South Perimeter Highway to Radcliffe Road. The effective date of this re-designation was April 1, 1987. The second area was between River Road and the Red River from the St. Amant Centre, River Road to Bishop Grandin Boulevard. The effective date of this re-designation was February 9, 1988.

The Minister of Manitoba Natural Resources also received a request to modify the floodway limit on an area fronting on MacBell Road south of Coultier Drive in Fort Garry on December 7, 1987. Although modifying the floodway limit will not affect the conveyance of the Red River, development of this area will require approximately 3 m of fill. However, this re-designation cannot be finalized until there is an agreement to continue the Flood Risk Mapping Program.

4.1.23.2 Omands Creek

The study to determine the flood risk areas of Omands Creek was completed. It is unlikely that designation of the flood risk areas will take place as all the surrounding land is fully developed and any floodwater would pass quickly.

4.1.24 Woodside: Whitemud River

No work was done during the period of this report.

4.1.25 Remaining Communities

As was reported in past annual reports, no work is planned for Hartney, Horndean, Rosenfeld or Thompson because of the low flood potential. Also, flood risk mapping will not proceed at Brunkild, Dominion City, Emerson, Letellier, Morris, Rosenort, St. Adolphe, St. Jean Baptiste and Ste. Rose du Lac as the Agreement Respecting the Construction of Flood Protection Projects in Manitoba will upgrade the level of protection offered by the existing dykes at these communities to conform to the one per cent flood level. This level has been adopted as a minimum standard for the Manitoba FDR program.

As of the 1987-88 fiscal year the required flood protection works at Letellier, St. Jean Baptiste, Morris, Rosenort and Brunkild were completed.

4.2 Flood Damage Reduction Studies Program

In previous years, flood damage reduction options were examined in studies completed for Ste. Rose du Lac (1977 and 1982), Souris (1981), and Brandon (1983). Other options were examined for Emerson, Letellier, Dominion City, St. Jean Baptiste, Morris, Rosenort, Brunkild and St. Adolphe by the Ad Hoc Task Force on Manitoba Flood Mitigation Projects in 1981. Flood depth - damage curves were also developed from the flood damage data of the 1979 Red River flood in 1983. Table 2 shows the status of flood risk mapping and studies activities for each community on Schedule A.

During 1987-88, flood damage reduction studies at Elie were held in abeyance because of a staff reduction in Manitoba Water Resources Branch. Studies continued for Morden and Riverton but the final reports were not completed.

The Manitoba Disaster Assistance Board made a request to fund a study on the adequacy of floodproofing on structures located in the Red River Valley from past floods, particularly for those structures floodproofed after the 1979 Flood. The study was to determine the scope of the problem and to recommend methods and to provide estimated costs of increasing the flood protection level to the 100-year flood standard. The request was turned down because the Flood Damage Reduction Program had no funds to accommodate the request.

4.3 The Flood Forecasting Program

Preparation of a final draft report on Phase Two activities for the period February, 1984 to March, 1986 was completed. It was entitled "Phase Two - Application and Evaluation". The report included details on HSPF modelling on Willow Creek, Gopher Creek and Elgin Creek and documentation on tributary channel routing studies. There were two appendices to the report: the first discussed the problems associated with the application of the HSPF model to the prairie environment and some of the solutions which were employed; the second discussed the theory behind the various flood routing methodologies.

The dynamic streamflow routing application on the Red River from Emerson to Winnipeg was nearing completion. Staff of the Water Planning and Management Branch, Environment Canada, plan to demonstrate the procedure at the Manitoba River Forecast Centre during the summer of 1988 and to assist in adapting it to the mini computer at Manitoba Water Resources Branch.

The Telidon weather radar system evaluation period ended during the fiscal year. While a lack of rainstorms hampered the evaluation, the radar system was made operational. A MIND microcomputer was purchased to facilitate archiving and rapid display of radar images.

Four Telemark II water level data transmission devices were purchased during the fiscal year. These instruments will be installed during 1988 on Rock Lake, Seine River Diversion at Provincial Trunk Highway 59, Antler River near Melita and Oak River near Rivers.

TABLE 1

CANADA-MANITOBA FLOOD DAMAGE REDUCTION PROGRAM

EXPENDITURES FOR 1977-88

	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83
General Mapping	$ 1,000.00	$ 16,515.59	18,315.52	$ 48,005.93	$ 38,506.47	$ 79,288.38
Arborg	-	-	-	10,667.29	11,212.08	6,583.48
Assiniboine River	-	-	-	1,032.00	-	-
Brandon	-	-	81,502.96	75,457.90	32,798.75	4,131.64
Carman	17,082.12	21,957.83	6,577.98	23,815.41	15,361.80	389.38
Dauphin	-	-	19.70	39,746.68	34,095.53	11,161.48
Elie	22,817.76	27,270.36	6,798.22	9,040.40	487.05	174.91
Fisher Branch	-	-	-	8,802.96	12,838.20	12,806.15
Gimli	-	-	-	22.55	31,333.93	1,373.00
Gladstone	-	-	-	12,208.25	21,558.28	2,442.35
Grande Pointe	-	-	21.55	14,760.86	11,969.46	-
Gretna	-	-	-	414.00	17,943.40	365.00
Hartney	-	-	-	323.00	91.00	-
Horndean	-	-	-	403.00	91.00	-
La Riviere	-	-	-	251.00	31,189.27	4,339.96
La Salle	-	8,162.39	5,673.36	14,573.01	7,862.49	4,563.43
Lorette	-	-	-	624.55	21,910.29	18,293.59
MacGregor	-	-	-	6,092.13	28,415.53	1,850.47
Melita	8,806.00	9,536.44	2,102.46	10,172.60	56.42	430.78
Minnedosa	-	-		12,478.02	20,989.65	3,354.27
Morden	-	-	2,631.07	20,373.18	23,670.63	25,407.61
Neepawa	-	-	16,088.39	28,785.60	33,242.27	5,118.02
Ochre River	-	-	-	19,271.85	5,756.92	-
Ritchot	4,772.39	13,700.31	-	312.00	-	-
Riverton	-	-	-	6,052.92	15,129.77	4,483.00
Rosenfeld	-	-	-	427.00	14,350.09	253.00
Ste. Anne	-	-	-	482.00	32,963.33	13,064.86
Ste. Rose du Lac	-	-	14,219.19	16,657.66	12,273.59	4,860.16
Sanford	-	-	12,939.42	11,577.82	5,990.65	5,190.43
Souris	14,615.24	13,515.46	3,464.92	11,088.76	44.82	711.69
Starbuck	-	-	7,382.93	13,239.36	27,204.80	16,029.98
Swan River	-	-	-	17,206.72	17,851.50	9,370.26
The Pas	-	-	-	581.00	33,909.89	24,141.17
Thompson	-	-	-	433.00	14.00	-
Virden	-	-	-	146.00	38,866.04	13,250.51
Wawanesa	4,491.00	4,063.76	7,034.36	12,374.19	17.78	430.78
Westbourne	-	-	-	8,239.27	6,148.00	5,167.20
Winnipeg	-	37,563.98	47,660.87	9,585.35	3,461.52	4,724.14
Woodside	-	-	-	1,336.41	1,554.51	5,776.46
Brochure	3,500.00	-	-			
TOTAL MAPPING	$ 77,084.51	$152,286.12	$232,432.90	$467,061.63	$611,160.71	$289,527.54
General Studies	-	-	2,177.48	6.79	7,357.23	1,923.15
Arborg	-	-	-	-	-	-
Brandon	-	-	-	-	15,117.52	6,298.16
Carman	-	-	476.85	-	-	-
Elie	-	-	-	-	-	-
Gimli	-	-	-	-	2,817.49	60.00
Gladstone	-	-	-	-	-	299.61
Letellier	-	-	-	-	575.93	-
Morden	-	-	-	-	-	3,146.21
Morris	-	-	-	-	195.25	-
Riverton	-	-	-	-	-	-
Ste. Rose du Lac	-	-	-	3,982.87	8,826.82	1,215.20
Souris	-	-	-	-	4,389.62	1,215.20
Wawanesa	-	-	1,320.00	-	-	-
Winnipeg	-	-	4,368.65	261.08	361.98	-
TOTAL STUDIES	$ -	$ -	$ 8,342.98	$ 4,250.74	$ 39,641.84	$ 14,157.53
Flood Forecasting						
- Phase One	-	-	-	-	71,087.91	172,672.23
- Phase Two	-	-	-	-	-	-
TOTAL FLOOD FORECASTING	$ -	$ -	$ -	$ -	$ 71,087.91	$172,672.23
GRAND TOTAL	$ 77,084.51	$152,286.12	$240,775.88	$471,312.37	$721,890.46	$476,357.30

TABLE 1 (continued)

CANADA-MANITOBA FLOOD DAMAGE REDUCTION PROGRAM

EXPENDITURES FOR 1977-88

	1983-84	1984-85	1985-86	1986-87	1987-88	1977-88(Total)
General Mapping	$ 56,429.23	$ 39,223.22	$ 9,299.64	$ 8,257.55	$ 5,404.21	$ 320,245.74
Arborg	12,548.35	758.14	3,616.35	1,243.89	8,113.01	54,742.59
Assiniboine River	-	-	-	-	-	1,032.00
Brandon	1,454.00	-	-	-	-	195,345.25
Carman	810.00	6,316.15	45.00	-	-	92,355.67
Dauphin	8,732.03	6,099.25	58.50	47.39	-	99,960.56
Elie	1,357.25	-	-	-	-	67,945.95
Fisher Branch	19,683.03	7,812.66	6,547.29	9,955.30	6,439.69	84,885.28
Gimli	-	-	-	-	-	32,729.48
Gladstone	5,073.58	10,731.74	-	-	-	52,014.20
Grande Pointe	2,006.97	-	-	-	-	28,758.84
Gretna	-	-	-	-	-	18,722.40
Hartney	-	-	-	-	-	414.00
Horndean	-	-	-	-	-	494.00
La Riviere	-	-	-	-	-	35,780.23
La Salle	72.48	-	-	589.16	-	41,496.32
Lorette	6,809.60	4,235.61	777.50	47.39	-	52,698.53
MacGregor	29.97	-	-	-	-	36,388.10
Melita	-	-	-	-	-	31,104.70
Minnedosa	544.21	12,343.65	-	-	-	49,709.80
Morden	27,302.71	4,115.90	4,581.00	8,842.55	7,197.53	124,122.18
Neepawa	561.33	28,840.80	3,454.34	4,271.45	3,612.22	123,974.42
Ochre River	199.30	-	-	-	-	25,228.07
Ritchot	-	-	-	-	-	18,784.70
Riverton	16,382.52	9,119.84	1,814.31	4,478.67	7,350.89	64,811.92
Rosenfeld	-	-	-	-	-	15,030.09
Ste. Anne	319.42	-	-	-	-	46,829.61
Ste. Rose du Lac	-	-	-	-	-	48,010.60
Sanford	72.46	-	-	-	-	35,770.78
Souris	-	-	-	-	-	43,440.89
Starbuck	1,651.61	-	-	-	-	65,508.68
Swan River	6,182.67	-	-	-	-	50,611.15
The Pas	18,866.90	-	373.38	3,235.90	8,193.76	89,302.00
Thompson	-	-	-	-	-	447.00
Virden	7,547.42	-	373.39	1,918.90	5,817.75	67,920.01
Wawanesa	-	-	-	-	-	28,411.87
Westbourne	3,505.82	-	-	-	-	23,060.29
Winnipeg	9,624.95	-	5,830.96	40,981.18	9,865.23	169,298.18
Woodside	-	-	-	-	-	8,667.38
Brochure	-	-	-	-	-	3,500.00
TOTAL MAPPING	$207,767.81	$129,596.96	$ 36,771.66	$ 83,869.33	$ 61,994.29	$2,349,553.46
General Studies	-	8,691.18	39,294.33	8,433.13	7,566.60	75,449.89
Arborg	-	-	-	-	34.00	34.00
Brandon	-	-	-	-	-	21,415.68
Carman	-	-	-	-	-	476.85
Elie	-	3,657.17	13,562.22	971.19	-	18,190.58
Gimli	-	-	-	-	-	2,877.49
Gladstone	-	-	-	-	-	299.61
Letellier	-	-	-	-	-	575.93
Morden	3,146.21	7,371.52	21,034.43	21,765.00	23,524.53	77,253.24
Morris	-	-	-	-	-	195.25
Riverton	-	6,848.73	22,474.67	23,544.60	26,498.96	79,366.96
Ste. Rose du Lac	-	-	-	-	-	14,024.89
Souris	-	-	-	-	-	5,604.82
Wawanesa	-	-	-	-	-	1,320.00
Winnipeg	-	-	69.87	69.87	-	5,131.45
TOTAL STUDIES	$ 411.55	$ 26,568.60	$ 96,435.52	$ 54,783.79	$ 57,624.09	$ 302,216.64
Flood Forecasting						
- Phase One	172,672.23	-	-	-	-	353,618.77
- Phase Two	-	118,349.63	102,294.36	114,505.49	114,988.97	466,025.74
TOTAL FLOOD FORECASTING	$125,745.92	$118,349.63	$102,294.36	$114,505.49	$114,988.97	$ 819,644.51
GRAND TOTAL	$333,925.28	$274,515.19	$235,501.54	$253,158.61	$234,607.35	$3,471,414.61

TABLE 2

CANADA-MANITOBA FLOOD DAMAGE REDUCTION PROGRAM
STATUS REPORT TO MARCH 31, 1988

Communities	Base Map	Designation Date	Flood Damage Reduction Study	Remarks
Arborg	completed	87 11 05		
Assiniboine River	no			Because of the high cost of mapping, this project will not be done.
Brandon	completed	82 03 26	completed	
Brunkild	no			See Chapter 4.1.25
Carman	completed	84 06 13	completed	
Dauphin	completed	84 02 15		
Dominion City	no			See Chapter 4.1.25
Elie	completed	80 11 05	unfinished	
Emerson	no			See Chapter 4.1.25
Fisher Branch	completed	87 11 05		
Gimli	completed			No further activities will be done under this Agreement as the Province will be constructing a diversion to control flooding.
Gladstone	completed			
Grande Pointe	completed			

TABLE 2 (continued)

Communities	Base Map	Designation Date	Flood Damage Reduction Study	Remarks
Gretna	completed			It is unlikely that flood risk maps will be prepared as the community is affected from overflows of the Pembina River located on the U. S. side.
Hartney	no			No work is planned because of low flood potential.
Horndean	no			No work is planned because of low flood potential from overflows of the Hespeler Channel.
La Riviere	completed			
La Salle	completed	82 11 26		
Letellier	no			See Chapter 4.1.25
Lorette	completed	84 09 13		
MacGregor	completed			
Melita	completed	79 12 20		Interim designation based on existing topographical maps.
Minnedosa	completed			
Morden	completed		continuing	
Morris	no			See Chapter 4.1.25
Neepawa	completed			Designation held in abeyance due to termination of Agreement.

TABLE 2 (continued)

Communities	Base Map	Designation Date	Flood Damage Reduction Study	Remarks
Ochre River	completed			
Ritchot	no			Will not be done because of the high cost of mapping.
Riverton	completed	87 11 05	continuing	
Rosenfeld	completed			
Rosenort	no			See Chapter 4.1.25
St. Adolphe	no			See Chapter 4.1.25
St. Jean Baptiste	no			See Chapter 4.1.25
Ste. Anne	completed			
Ste. Rose du Lac	completed		completed	See Chapter 4.1.25
Sanford	completed	82 11 26		
Souris	completed	80 10 01	done (SRBS)	Flood protection works for the Water Treatment Plant house will be constructed under the Agreement Respecting the Construction of Flood Protection Projects in Manitoba.
Starbuck	completed	82 11 26		
Swan River	completed	83 05 11		
The Pas	completed			

TABLE 2 (continued)

Communities	Base Map	Designation Date	Flood Damage Reduction Study	Remarks
Thompson	no			No work will be done as flood prone lands are under license for water power generation.
Virden	completed			
Wawanesa	completed	79 12 20	done (SRBS)	Interim designation based on existing topographical maps.
Westbourne	completed			Base maps do not meet specifications.
Winnipeg:				
Red River	no			
Assiniboine	no			
Seine River	no	80 02 15		Interim designation based on 61 existing topographical maps. 21 map sheets comprising 13 sheets in the St. Norbert area and 8 sheets in the St. Charles and Westwood areas were prepared under the Agreement.
La Salle River	completed			
Omands Ck.	no			
Woodside	completed			

Notes:

- "no" means action will not be done.
- "SRBS" means study carried out under the Souris River Basin Study.

APPENDIX "A"

AREAS AND FLOODWAYS TO BE MAPPED IN THE PROVINCE OF MANITOBA

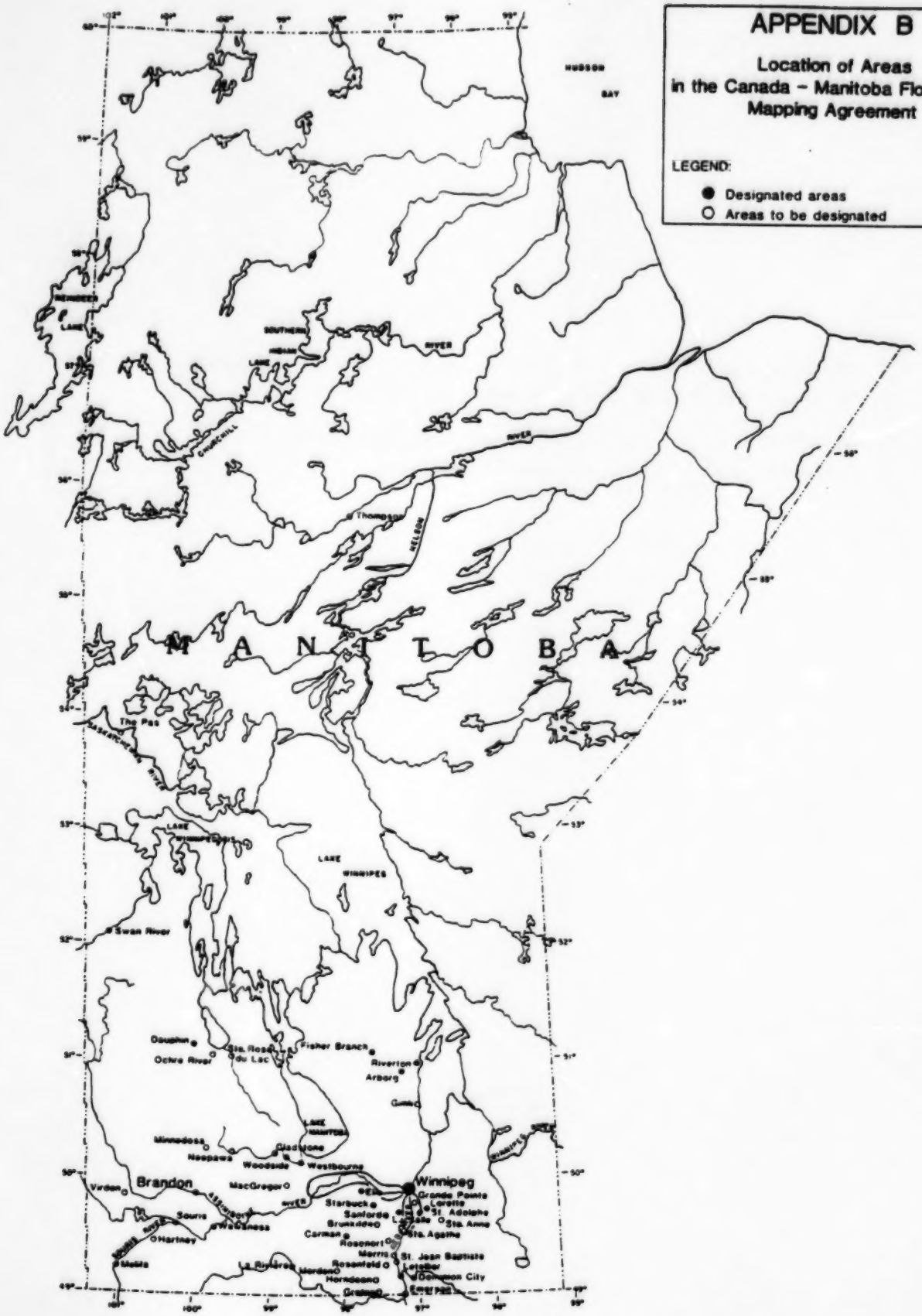
PLACE	BODY OF WATER	WHETHER FLOODWAY IS TO BE DELINEATED
Brandon and R.M. of Cornwallis	Assiniboine River from west of 21-10-19 W.P.M. to east of 19-10-18 W.P.M.	No
R.M. of Portage la Prairie, R.M. of St. Francois Xavier, R.M. of Cartier and the City of Winnipeg	Assiniboine River from Portage la Prairie to the western limit of the City of Winnipeg	No
Carman and R.M. of Dufferin	Boyne River from west of 23-6-5 W.P.M. to east of 29-6-4 W.P.M.	Yes
Gimli and R.M. of Gimli	Overflows from the Gimli Airport Drain. Area to be mapped to be shown on location plan.	Yes
Thompson and L.G.D. of Mystery Lake	Burntwood River (to be shown on location plan)	No
Fisher Branch and L.G.D. of Fisher	Fisher River from west of 14-24-2 W.P.M. to east 24-24-2 W.P.M.	Yes
Arborg and R.M. of Bifrost	Icelandic River from west of 22-22-2 E.P.M. to east of 24-22-2 E.P.M.	Yes
Riverton and R.M. of Bifrost	Icelandic River from south of 17-23-4 E.P.M. to north of 21-23-4 E.P.M.	Yes
Rosenort and R.M. of Morris	Morris River from south of 6-6-1 E.P.M. to north of 7-6-1 E.P.M.	No

PLACE	BODY OF WATER	WHETHER FLOODWAY IS TO BE DELINEATED
Brunkild and R.M. of MacDonald	Morris River form south of 19-7-1 W.P.M. to north of 30-7-1 W.P.M.	No
Minnedosa and R.M. of Minto	Minnedosa River from west of 3-15-18 W.P.M. to north of 1-15-18 W.P.M.	Yes
Ochre River and R.M. of Ochre River	Ochre River from south of 9-24-17 W.P.M. to north of 15-24-17 W.P.M.	Yes
Gretna and R.M. of Rhineland	Pembina River (in 5-1-1 W.P.M.)	Yes
La Riviere and R.M. of Pembina	Pembina River from west of 25-3-10 W.P.M. to south of 19-3-9 W.P.M.	No
Emerson and R.M. of Montcalm and R.M. of Franklin	Red River from International Boundary to north of 12-1-2 E.P.M.	No
Letellier and R.M. of Montcalm	Red and Aux Marais Rivers from south of 18-2-2 E.P.M. to east of 20-2-2 E.P.M.	No
Morris and R.M. of Morris	Red and Morris Rivers from east of 35-4-1 E.P.M. to east of 2-5-1 E.P.M.	No
St. Jean Baptiste and R.M. of Montcalm	Red and Plum Rivers from south of 36-3-1 E.P.M. to north of 1-4-1 E.P.M.	No
R.M. of Ritchot and the City of Winnipeg	Red River from southern limit of R.M. of Ritchot to Red River Floodway Control Structure	Yes
Elie and R.M. of Cartier	La Salle River from north of 11-11-3 W.P.M. to south of 2-11-3 W.P.M.	Yes
Starbuck and R.M. of MacDonald	La Salle River from west of 26-9-2 W.P.M. to east of 25-9-2 E.P.M.	Yes

PLACE	BODY OF WATER	WHETHER FLOODWAY IS TO BE DELINEATED
Sanford and R.M. of MacDonald	La Salle River from north of 30-8-1 E.P.M. to south of 29-8-1 E.P.M.	Yes
R.M. of Ritchot, R.M. of MacDonald and the City of Winnipeg	La Salle River from east of 32-8-2 E.P.M. to Red River	Yes
Dominion City and R.M. of Franklin	Roseau River from north of 19-2-3 E.P.M. to east of 20-2-3 E.P.M.	No
The Pas and L.G.D. of Consul	Saskatchewan River Pasquia River to Rahl's Island	Yes
Grande Pointe and R.M. of Ritchot	Seine River from Grande Pointe (west of 20-9-4 E.P.M.) to Red River Floodway	Yes
Lorette and R.M. of Tache	Seine River from west of 8-9-5 E.P.M to the quarter section line of 9-9-5 E.P.M.	Yes
Ste. Anne	Seine River within the Village of Ste. Anne	Yes
Winnipeg	Sturgeon Creek from P.T.H. No. 101 to Assiniboine River	No
Melita and R.M. of Arthur	Souris River from west of 31-3-26 W.P.M. to east of 6-4-26 W.P.M.	No
Hartney and R.M. of Cameron	Souris River from Hartney Dam to west of 17-6-23 W.P.M.	No
Souris and R.M. of Glenwood	Souris River from south of 33-7-21 W.P.M. to one half mile east of P.R. 250	No

PLACE	BODY OF WATER	WHETHER FLOODWAY IS TO BE DELINEATED
Wawanesa and R.M. of Oakland	Souris River from west of 23-7-W.P.M. to east of 26-7-17 W.P.M.	No
Swan River and R.M. of Swan River	Swan River from south of 26-36-27 W.P.M. to east of 28-36-27 W.P.M.	Yes
Ste. Rose du Lac and R.M. of Ste. Rose	Turtle River from Ste. Rose Dam to north of 8-24-15 W.P.M.	Yes
Dauphin and R.M. of Dauphin	Vermillion River from quarter section line of 4-25-19 W.P.M. to north of 15-25-19 W.P.M.	Yes
Gladstone and R.M. of Westbourne	Whitemud River from west of 30-14-11 W.P.M. to east of 32-14-11 W.P.M.	Yes
Westbourne and R.M. of Westbourne	Whitemud River from P.T.H. No 4 to north of 25-13-9 W.P.M.	Yes
Woodside and R.M. of Westbourne	Whitemud River from west of 16-14-1 W.P.M. to east of 9-14-10 W.P.M.	Yes
Neepawa and R.M. of Langford	Whitemud River from southern Town Limit to north of 34-14-15 W.P.M.	No
Morden and R.M. of Stanley	Dead Horse Creek from Morden Dam to north of 8-3-5 W.P.M.	Yes
Virden and R.M. of Wallace	Gopher Creek from north of 27-10-26 W.P.M. to south of 15-10-26 W.P.M.	Yes
Hordean and R.M. of Rhineland	Hespler Channel from quarter section line of 9-3-2 W.P.M. to quarter section line of 10-3-2 W.P.M.	Yes
Rosenfeld and R.M. of Rhineland	Overflows from Hespeler Channel. Area to be mapped to be shown on location plan	Yes

PLACE	BODY OF WATER	WHETHER FLOODWAY IS TO BE DELINEATED
MacGregor and R.M. of North Norfolk	Beaver Creek. Area to be mapped to be shown on location plan	Yes
Winnipeg and Additional Zone	Red and Assiniboine Rivers and Tributaries	Yes


APPENDIX B
Location of Areas
in the Canada – Manitoba Flood Risk
Mapping Agreement
LEGEND:
Designated areas
Areas to be designated
MANITOBA
Winnipeg
Brandon
Dauphin
Ochre River
Ste. Rose du Lac
Fisher Branch
Riverton
Arborg
Gimli
Minnedosa
Neepawa
Gladstone
Woodside
Westbourne
Virden
MacGregor
Starbuck
Sanford
Grande Pointe
Loretta
St. Adolphe
Ste. Anne
Souris
Hartney
Carman
Rosenort
Morris
St. Jean Baptiste
Letellier
Rosenfeld
Altona
Morden
Hornedeno
Dominion City
Emerson
Swan River
The Pas
Thompson
HUDSON BAY
LAKE WINNIPEG